

## **CHAPTER 9**

## **GLOSSARY**



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*Chapter 9 provides definitions of technical terms used in the Global Nuclear Energy Partnership (GNEP) Programmatic Environmental Impact Statement (PEIS).*

**Absorbed dose:** The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material (e.g., biological tissue), in which the absorbed dose is expressed in units of rad or gray (1 rad = 0.01 gray).

**Accelerator:** An apparatus for imparting high velocities to charged particles (such as electrons, protons, and atomic nuclei).

**Actinide:** One of 15 elements that lie between actinium and lawrencium on the periodic table (atomic numbers 89-103). Both uranium and plutonium are actinides.

**Activation products:** Radionuclides formed by bombardment and adsorption in material with neutrons, protons, or other nuclear particles. For example, cobalt-60 is an activation product resulting from neutron activation of cobalt-59.

**Action level:** Defined by regulatory agencies, the level of pollutants which, if exceeded, requires regulatory action.

**Acute exposure:** A single, short-term exposure to radiation, a toxic substance, or other stressors that may result in biological harm.

**Activity:** In regard to radioactivity, the number of nuclear transformations occurring in a given quantity of material per unit time.

**Administrative limit:** A limit imposed by procedure on the quantity of a radionuclide permitted in a building or part of a building. This also refers to the limit allowed for radiation worker dose as well as accumulative radioactive material.

**Air Quality Control Region (AQCR):** An interstate or intrastate area designated by the U.S. Environmental Protection Agency (EPA) for the attainment and maintenance of National Ambient Air Quality Standards (NAAQS).

**Air quality:** Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances. Air quality standards are the prescribed level of constituents in the outside air that cannot be exceeded during a specific time in a specified area.

**Airborne Release Fraction (ARF):** The coefficient used to estimate the amount of radioactive material that can be suspended in air and made available for airborne transport under a specific set of induced physical stresses. ARF is used, along with other factors, to determine the source term for an accident or event.

**Alpha particle:** A positively charged particle ejected spontaneously from the nucleus of an atom during radioactive decay, having mass and charge equal to those of a helium nucleus (two protons and two neutrons).

**Ambient air:** The surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures; not considered for monitoring purposes when immediately adjacent to emission sources.

**Americium:** An artificial radioactive element (atomic number 95) produced by the beta decay of plutonium-241.

**Aquifer:** A body of permeable rock, rock fragments, or soil through which groundwater moves and is capable of yielding quantities of water to wells and/or springs.

**As low as reasonably achievable (ALARA):** An approach to radiation protection to manage and control worker and public exposures (both individual and collective) and releases of radioactive material to the environment to as far below applicable limits as social, technical, economic, practical, and public policy considerations permit. ALARA is not a specific dose limit, but a process for minimizing doses to as far below limits as reasonable.

**Atmospheric dispersion:** The spreading downwind of airborne material due to wind speed and atmospheric turbulence; the greater the spread, the greater the dilution and the smaller the airborne material concentrations.

**Attainment area:** An area that the EPA has designated as being in compliance with one or more of the NAAQS for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants but not for others.

**Atomic number:** The number of positively charged protons in the nucleus of an atom. In an electrically neutral atom, the atomic number is the number of electrons.

**Background radiation:** Radiation from: 1) cosmic sources; 2) naturally occurring radioactive materials, including radon (except as a decay product of source, by-product or special nuclear material [SNM]); and 3) global fallout as it exists in the environment (e.g., from the testing of nuclear explosive devices).

**Beryllium (Be):** A toxic and extremely lightweight metallic element with the atomic number 4. It is sometimes used in reactors as a neutron reflector.

**Beta particle:** A negatively charged electron or a positively charged positron emitted from a nucleus during radioactive decay.

**Beyond-design-basis accident:** A beyond-design-basis accident is a hypothetical postulated scenario more severe than a design-basis accident. It generally assumes multiple failures of engineered safety systems and would be expected to occur less than once in a million years.

**Bioassay:** Measurement of the amount or concentration of radioactive material in the body or in biological material excreted from or removed from the body and analyzed for the purposes of estimating the quantity of radioactive material in the body. This typically includes analysis of urine samples, fecal samples, and whole-body scans or lung counts.

**Biota:** The plant and animal life of a region.

**Blowdown:** Water discharged from cooling towers in order to control total dissolved solids concentrations by allowing make-up water to replenish cooling apparatuses.

**Bounding analysis:** A bounding analysis is an analysis designed to identify the range of potential impacts or risks, both upper and lower.

**Breed:** The process of producing more fissile material than is consumed.

**Breeder Reactor:** A nuclear reactor that produces more fissile material than it burns.

**Burnup:** Measurement of the fissile material consumed via fissioning during fuel irradiation.

**By-product material:** As defined in the *Atomic Energy Act* of 1954 (AEA), as amended, any radioactive material (except SNM) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

**Cadmium (Cd):** A soft, bluish-white metallic element (atomic number 48) occurring primarily in zinc, copper, and lead ores, that is easily cut with a knife and is used in low-friction, fatigue-resistant alloys, solders, dental amalgams, nickel-cadmium storage batteries, nuclear reactors shields, and in rustproof electroplating.

**Cancer:** A group of diseases characterized by uncontrolled cellular growth. Increased incidence of cancer can be caused by exposure to radiation or to certain chemicals at sufficient concentrations and exposure durations.

**Candidate species:** Species for which the U.S. Fish and Wildlife Service has enough substantive information on biological status and threats to support proposals to list them as threatened or endangered under the *Endangered Species Act*. Listing is anticipated but has been precluded temporarily by other listing activities.

**CANDU:** Canada Deuterium Uranium reactor, a pressurized heavy water-cooled power reactor that uses natural uranium or slightly enriched uranium fuel.

**Canister:** A stainless-steel container used for the storage, transport, and/or disposal of nuclear materials.

**Capacity factor:** A power production performance measure that compares the amount of power actually produced per year to the maximum power output possible. This measure is typically expressed as a fraction or percentage of the megawatt hours (MWh) produced relative to the possible MWh that would have been produced had the unit or system operated every hour of the year.

**Carbon dioxide (CO<sub>2</sub>):** A colorless, odorless, atmospheric gas generated primarily through the combustion of fossil fuels and the most common of gases generally attributed to creating “global warming.”

**Carbon monoxide (CO):** A colorless, odorless gas that is toxic if breathed in high concentrations over a period of time.

**Carcinogen:** A substance that directly or indirectly causes cancer.

**Cask:** A specially designed container used for shipping, storage, or disposal of radioactive material that affords protection from accidents and provides shielding for radioactive material. The design includes special shielding, handling, and sealing features to provide positive containment and minimize personnel exposure.

**Cesium (Cs):** A chemical element with the atomic number 55. A radioactive isotope of cesium, cesium-137, is a common fission product.

**Chronic exposure:** The absorption of radiation or intake of radioactive and/or chemical materials over a long period of time.

**Cladding:** The metal tube that forms the outer jacket of a nuclear fuel rod. It protects the fuel elements, provides structural support, and prevents the release of radioactive material into the coolant. Stainless steel and zirconium alloys are commonly used cladding materials.

**Code of Federal Regulations (CFR):** A codification of all regulations promulgated by Federal agencies.

**Collective dose equivalent and collective committed effective dose equivalent:** The sums of the dose equivalents or effective dose equivalents to all individuals in an exposed population within 50 miles (mi) (80 kilometers [km]) of the radiation source. These are evaluated by multiplying the dose received by an individual at each location by the number of individuals receiving that dose, and summing over all such products for locations within 50 mi (80 km) of the source. They are expressed in units of person-rem or person-sievert. The collective effective dose equivalent (EDE) is also referred to as the “population dose.”

**Committed effective dose equivalent (CEDE):** The calculated effective dose to an individual after exposure to radiation summed over the life of the individual. CEDE assumes a 70-year exposure period for the general population and a 50-year exposure period for the worker population.

**Confined aquifer:** An aquifer bounded above and below by impermeable beds, or beds of distinctly lower permeability than that of the aquifer itself.

**Consumptive water use:** The difference in the volume of water withdrawn from a body of water and the amount released back into the body of water.

**Containment barrier:** In the context of a Spent Nuclear Fuel (SNF) shipment or a high-level waste repository, a barrier to release of radioactivity made by man, such as a corrosion-resistant container.

**Control rod:** A rod containing material such as boron that is used to modulate and control the power of the fuel of a nuclear reactor. By absorbing excess neutrons, a control rod prevents the neutrons from causing further fissions; i.e., increasing power.

**Conversion ratio:** A measure of the efficiency by which a fast reactor consumes transuranics.

**Cooling water:** Water pumped into a nuclear reactor or accelerator to cool components and prevents damage from the intense heat generated when the reactor or accelerator is operating.

**Copper (Cu):** A ductile, malleable, reddish-brown metallic element (atomic number 29) that is an excellent conductor of heat and electricity and is widely used for electrical wiring, water piping, and corrosion-resistant parts, either pure or in alloys such as brass and bronze.

**Cosmic radiation:** Radiation with very high energies originating outside the Earth's atmosphere which is one source contributing to natural background radiation.

**Criteria Air Pollutants:** In 40 CFR Part 50, the EPA has identified seven specific pollutants that have well-known adverse effects on human health and welfare. These seven pollutants are called *criteria pollutants*, and they include CO, nitrogen dioxide (NO<sub>2</sub>), various oxides of sulfur (SO<sub>x</sub>), ozone (O<sub>3</sub>), lead (Pb), and two categories of particulate matter (PM), PM<sub>10</sub> and PM<sub>2.5</sub>.

**Critical habitat:** "Specific area within the geographical area occupied by [an endangered or threatened] species..., essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species...that are essential for the conservation of the species" (*Endangered Species Act*, Section 3).

**Criticality:** A nuclear chain reaction that is self-sustaining. This occurs in a nuclear reactor as a controlled reaction to produce energy.

**Cultural resources (historic):** Material remains, such as trash dumps and architectural features, including structures, foundations, basements, and wells; any other physical alteration of the landscape, such as ponds, roads, landscaping, and fences.

**Cultural resources (prehistoric):** Any material remains of items used or modified by people, such as artifacts of stone, bone, shellfish, or wood. Animal bone, fish remains, bird bone, or shellfish remains used for foods are included. Physical alteration of the landscape, such as hunting blinds, remains of structures, excavated house pits, and caches of artifacts or concentrations of stones (such as cooking stones) are also prehistoric cultural resources.

**Curie (Ci):** A unit of measurement of radioactivity defined as the amount of radioactive material in which the decay rate is  $3.7 \times 10^{10}$  disintegrations per second or  $2.22 \times 10^{12}$  disintegrations per minute: 1 curie is approximately equal to the decay rate of 1 gram of pure radium.

**Damage Ratio (DR):** The fraction of the material-at-risk impacted by accident-generated conditions.

**Decay heat:** The heat produced by the decay of certain radionuclides.

**Decay, radioactive:** The decrease in the amount of radioactive material with the passage of time, due to the spontaneous emission of either alpha or beta particles from the atomic nuclei, often accompanied by gamma radiation.

**Decommissioning:** The process of removing a facility from operation, followed by decontamination, entombment, dismantlement, or conversion to another use.

**Decontamination:** The actions taken to reduce or remove substances that pose a substantial present or potential hazard to human health or the environment—such as radioactive or chemical contamination of facilities, soil, or equipment—by washing, chemical action, mechanical cleaning, or other techniques.

**Depleted uranium:** Uranium which has a lower proportion of the fissile isotope U-235 than is found in naturally occurring uranium, i.e., less than approximately 0.711 percent by weight U-235.

**Deposition:** A comprehensive term used for the various ways that compounds precipitate from the atmosphere and deposit onto surfaces.

**Derived Concentration Guide:** Concentrations of radionuclides in water and air that could be continuously consumed or inhaled for one year and not exceed the U.S. Department of Energy (DOE) primary radiation standard to the public (100 mrem/year EDE).

**Deterministic:** With results determined by input assumptions and data, but without the probability of occurrence.

**Deuterium:** A hydrogen isotope that is twice the mass of ordinary hydrogen and that occurs naturally in water; also called heavy hydrogen.



**Dose:** The energy imparted to matter by ionizing radiation; the unit of absorbed dose is the rad, equal to 0.01 joules per kilogram for irradiated material in any medium. Various technical terms—such as dose equivalent, effective dose equivalent, and collective dose—are used to evaluate the amount of radiation an exposed individual or population receives.

**Dose equivalent:** The product of absorbed dose in rad (or gray) in tissue and a quality factor representing the relative damage caused to living tissue by different kinds of radiation, and perhaps other modifying factors representing the distribution of radiation, etc., expressed in units of rem or sievert (1 rem = 0.01 sievert).

**Dosimeter:** A portable detection device for measuring the total accumulated exposure to ionizing radiation.

**Dosimetry:** The theory and application of the principles and techniques of measuring and recording radiation doses.

**DUPIC (direct use of spent PWR fuel in CANDU):** Fuel cycle that fabricates heavy water reactor fuel from pressurized water reactor (PWR) spent fuel by using dry thermal/mechanical processes without separating stable fission products.

**Effective dose equivalent:** An estimate of the total risk of potential effects from radiation exposure, it is the summation of the products of the dose equivalent and weighting factor for each tissue. The weighting factor is the decimal fraction of the risk arising from irradiation of a selected tissue to the total risk when the whole body is irradiated uniformly to the same dose equivalent. These factors permit dose equivalents from nonuniform exposure of the body to be expressed in terms of an effective dose equivalent that is numerically equal to the dose from a uniform exposure of the whole body that entails the same risk as the internal exposure.

**Effluent:** A waste stream flowing into the atmosphere, surface water, ground water, or soil. Most frequently the term applies to wastes discharged to surface waters.

**Emergency Response Planning Guidelines:** Estimates of concentration ranges at which adverse effects can be expected if exposure to a specific chemical lasts more than 1 hour.

**Emergency Response Planning Guidelines-1 (ERPG-1):** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient and adverse health effects or perceiving a clearly defined, objectionable odor.

**Emergency Response Planning Guidelines-2 (ERPG-2):** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

**Emergency Response Planning Guidelines-3 (ERPG-3):** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

**Emission sources:** Based on the criteria pollutant emission potential, a stationary emission source is designated as either a minor source or a major source. This designation (minor or major) determines the applicable state and federal permit requirements, as well as the requirements for an impact analysis. A large emission source is generally required to apply for both a preconstruction permit and an operations permit. The major source emission thresholds for a preconstruction permit are not the same as major source emission thresholds for an operations permit. Therefore, a new source can be designated as minor with respect to preconstruction permit, but major with respect to the operations permit. In addition, a source can be designated as minor or major with respect to Hazardous Air Pollutants (HAPs) emissions. This designation determines the applicable National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements for the source.

**Endangered species:** Species of plants and animals that are threatened with either extinction or serious depletion in their range and that are formally listed as such by the U.S. Fish and Wildlife Service and that are legally protected.

**Engineered barriers:** Manmade components of a system designed to prevent the release of radionuclides into the environment. These barriers include the radioactive waste form, radioactive waste canisters, and other materials placed over and around such canisters.

**Enriched uranium:** Uranium, in which the proportion of U-235 to U-238 has been increased above the natural approximately 0.711 percent U-235. Reactor-grade uranium is usually 3 to 5 percent U-235.

**Enrichment:** The physical process of increasing the proportion (or ratio) of U-235 to U-238 to make the mixture more usable as nuclear fuel.

**Environmental Impact Statement (EIS):** The detailed written statement that is required by section 102(2)(C) of the *National Environmental Policy Act* (NEPA) for a proposed major Federal action significantly affecting the quality of the human environment. A DOE EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality NEPA regulations in 40 CFR Parts 1500-1508, and the DOE NEPA regulations in 10 CFR Part 1021. The statement includes, among other information, discussions of the environmental impacts of the proposed action and all reasonable alternatives, adverse environmental effects that can not be avoided should the proposal be implemented, the relationship between short-term uses of the human environment and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources.

**Environmental justice:** The fair treatment of people of all races, cultures, national origins, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength.

**Exponential notation:** A means of expressing large or small numbers in powers of 10. For example,  $4.3 \times 10^6 = 4,300,000$  and  $4.3 \times 10^{-5} = 0.000043$ . This relationship is also sometimes expressed in the form  $4.3E+6 = 4,300,000$ , and  $4.3E-5 = 0.000043$ .

**Exposure:** The condition of being made subject to the action of radiation or toxic material. Sometimes also used as a generic term to refer to the dose of radiation absorbed by an individual or population. Each exposure pathway includes a source or a release from a source, an exposure, and an exposure pathway or route.

**Exposure assessment:** The determination of the magnitude, frequency, duration, and route of exposure.

**Exposure pathway:** The course a chemical or physical agent takes from the source to the exposed organism. An exposure pathway describes a unique mechanism by which an individual or population is exposed to chemicals or physical agents at or originating from a release site.

**Expression of Interest (EOI):** An offer made by a supplier; usually in response to a publicly advertised invitation, for the supply of a specific requirement.

**External exposure:** Radiation exposure from sources outside of the body, e.g., from cloud passage, material deposited on the ground, and nearby surfaces.

**Fast neutrons:** A free neutron with a kinetic energy level close to 1 megaelectron-volt (MeV) (10 TJ/kg), hence a speed of 14,000 km/s. The fast neutrons are distinguished from lower-energy thermal neutrons, and high-energy neutrons produced in cosmic showers or accelerators, in that they are produced by nuclear processes such as nuclear fission.

**Fault (faultline):** A fracture in the Earth's crust accompanied by displacement of one side of the fracture with respect to the other and in a direction parallel to the fracture.

**Federal facility:** A facility that is owned or operated by the Federal Government.

**Federal Facility Agreement (FFA):** A negotiated agreement that specifies required actions at a Federal facility as agreed upon by various agencies (e.g., EPA, a relevant state agency and DOE).

**Federal Register:** A document published daily by the Federal Government containing notification of government agency actions, including notification of EPA and DOE decisions concerning permit applications, NEPA actions, and rulemaking.

**Federally listed species:** A species, which pursuant to the *Endangered Species Act* of 1973, has been determined by the U.S. Fish and Wildlife Service to be of concern. See “Threatened, endangered, candidate, or rare species.”

**Fertile material:** A term used to describe nuclides which generally themselves do not undergo induced fissions (fissionable by thermal neutrons) but from which fissile material is generated by neutron absorption and subsequent nuclei conversions.

**Fissile material/fissile isotope:** An isotope that readily fissions after absorbing a neutron of any energy, either slow or fast.

**Fission:** The splitting of a heavy atomic nucleus into two or more nuclei of lighter elements, accompanied by the release of energy and the release of one or more neutrons. It can occur spontaneously or be induced by neutron bombardment. It is the fundamental principle by which nuclear power reactors work.

**Fission Product:** The atoms formed by the fission of heavy elements such as uranium.

**Fissionable material:** Material that will undergo nuclear fission when exposed to neutrons.

**Floodplain:** The valley floor adjacent to the incised channel of a stream, which may be flooded during high water.

**Footprint:** The area of ground covered or taken up by the layout of a facility on the ground; refers also to an area affected by release of radioactive materials.

**Fuel assembly:** A cluster of fuel rods that are inserted into a reactor core. Also called a fuel element.

**Fuel Cycle:** The progression of nuclear fuel through a series of differing stages. It consists of steps in the *front end*, which are the preparation of the fuel, steps in the *service period* in which the fuel is used during reactor operation, and steps in the *back end*, which are necessary to safely manage, contain, and either reprocess or dispose of SNF. If SNF is not reprocessed, the fuel cycle is referred to as an *open fuel cycle* (or a *once-through fuel cycle*). If the SNF is reprocessed, it is referred to as a *closed fuel cycle*.

**Fuel rod:** Nuclear reactor component that includes the fissile material, which combined with other fuel rods form the fuel assembly.

**Fugitive dust:** The dust released from activities such as construction, manufacturing, or transportation.

**Fugitive emissions:** Uncontrolled emissions to the atmosphere from pumps, valves, flanges, seals, and other process points not vented through a stack. Also includes emissions from area sources such as ponds, lagoons, landfills, and piles of stored material.

**Funding Opportunity Announcement (FOA):** A publicly available document by which a Federal agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. Funding opportunity announcements may be known as program announcements, requests for applications, notices of funding availability, solicitations, or other names depending on the agency and type of program.

**Gamma radiation:** Short-wavelength electromagnetic radiation emitted from the atomic nucleus with typical energies ranging from 10 kiloelectron-volts (keV) to 9 MeV. Individual gammas considered as particles are also called photons. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials such as lead or uranium. Gamma rays are similar to x-rays, but are usually more energetic.

**Gaussian plume:** The distribution of material (a plume) in the atmosphere resulting from the release of pollutants from a stack or other source. The distribution of concentrations about the centerline of the plume, which is assumed to decrease as a function of its distance from the source and centerline (Gaussian distribution), depends on the mean wind speed and atmospheric stability.

**Geologic repository:** See “Repository.”

**Global commons:** The environment outside the jurisdiction of any nation (e.g., the oceans or Antarctica).

**Global warming:** The theory that increasing concentrations of certain gases such as carbon dioxide, methane, and other gases in the Earth's atmosphere are effectively reducing radiant cooling, thus elevating the Earth's ambient temperatures.

**Glovebox:** A sealed box in which workers, while remaining outside and using gloves attached to and passing through openings in the box, can safely handle and work with radioactive materials, other hazardous materials, and non-hazardous air-sensitive compounds.

**Gram (g):** The standard metric measure of weight approximately equal to 0.035 ounce.

**Greater-Than-Class-C low-level radioactive waste (GTCC LLW):** As defined by the Nuclear Regulatory Commission in 10 CFR 72.3, low-level radioactive waste that exceeds the concentration limits of radionuclides established for Class C waste in 10 CFR 61.55. GTCC LLW is generated by U.S. Nuclear Regulatory Commission (NRC) or Agreement State-licensed activities.

**Greenhouse gases:** Thermal gases in the earth's atmosphere, which absorb heat radiation from the earth's surface and re-radiate it, thereby warming the earth. CO<sub>2</sub>, water vapor (H<sub>2</sub>O), and methane (CH<sub>4</sub>) are the most important greenhouse gases. A higher level of greenhouse gases in the environment, i.e. due to the combustion of fossil fuels, can enhance the greenhouse effect and generally is considered to contribute to global warming.

**Grid-appropriate reactor:** Small electricity producing reactor that could be used in countries with limited infrastructures.

**Gross alpha:** The concentration of all alpha-emitting radionuclides in a sample.

**Gross beta:** The concentration of all beta-emitting radionuclides in a sample.

**Groundwater:** Water below the ground surface in the saturated zone.

**Habitat:** Area in which a plant or an animal lives.

**Half-life (biological):** The time required for the body to eliminate one-half of an administered dosage of any substance by regular processes of elimination.

**Half-life (ecological):** The time required for the removal of one-half of the amount of a material deposited in the local environment.

**Half-life (radiological):** The time required for one-half the radioactive atoms in a given amount of material to decay; for example, after one half-life, half of the atoms will have decayed; after two half-lives, three-fourths; after three half-lives, seven-eighths; and so on, exponentially.

**Hazardous Air Pollutants (HAPs):** HAPs are any of the pollutants listed in or pursuant to Section 112(b) of the *Clean Air Act*.

**Hazardous chemical:** Any chemical that is a physical and/or a health hazard as defined by the Occupational Safety and Health Administration (29 CFR 1910.1201). For *Superfund Amendments and Reauthorization Act* (SARA) Title III, Section 311, the term is defined the same with certain named exceptions.

**Hazardous material:** A substance or material, including hazardous substances, which have been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property.

**Hazardous waste:** Waste regulated under the *Resource Conservation and Recovery Act* that, if managed improperly, could pose a threat to human health and the environment.

**Heavy Water Reactor (HWR):** Nuclear reactors using heavy water as a neutron moderator. Heavy water is deuterium oxide, D<sub>2</sub>O. Deuterium is an isotope of hydrogen.

**High-efficiency particulate air (HEPA) filter:** An extended-media, dry type filter used to capture particulates from an air stream. HEPA collection efficiencies are at least 99.97 percent for 0.3 micrometer diameter particles.

**High (or Highly) enriched uranium:** Uranium whose content of the fissile isotope uranium-235 has been increased through enrichment to 20 percent or more (by weight).

**High-level radioactive waste (HLW):** As defined by the *Nuclear Waste Policy Act* of 1982, as amended, means the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that NRC, consistent with existing law, determines by rule requires permanent isolation.

**High temperature gas-cooled reactor (HTGR):** A nuclear reactor that is cooled by gas (usually helium) and is able to achieve relatively high operating temperatures compared to other reactor types.

**Historic resources:** The sites, districts, structures, and objects considered limited and nonrenewable because of their association with historic events, persons, social, or historic movements.

**Hot cell:** A heavily shielded room that is maintained at a negative pressure and contains remote handling equipment and viewing systems to support work with radioactive material.

**Impact:** The positive or negative effect, influence, or imprint of an activity on the environment including direct or primary effects, caused by the project and occurring at the same time and place, including indirect or secondary effects, and caused by the project and occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect or secondary effects may include growth-inducing or other effects related to the changes in the pattern of land use, population density, growth rate, and related effects on air and water and other natural systems, including ecosystems.

**Infrastructure:** Physical support systems needed to operate a facility including electric distribution systems, water supply systems, sewage disposal systems, roads, etc.

**Ingestion dose:** An internal dose resulting from the oral intake of food, water, soil, or other media contaminated with radioactive material.

**Input parameters:** Variables needed to run a mathematical model.

**In-situ:** Refers to conducting an activity in place without excavation, as in-place (*in-situ*) mining of uranium ore by leaching.

**Internal exposure:** Radiation exposure from sources inside the body from materials ingested, inhaled, or (in the case of tritium) absorbed through the skin.

**International Atomic Energy Agency (IAEA):** The world's center of cooperation in the nuclear field. It was set up as the world's "Atoms for Peace" organization in 1957 within the United Nations family. The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies.

**International Commission on Radiological Protection (ICRP):** An international organization that studies radiation, including its measurement and effects.

**Inventory:** The amount of a radioactive or hazardous material present in a building or a facility.

**Involved worker:** Worker who would participate in a proposed action.

**Isoconcentration map:** A map showing contours of equal concentration of a contaminant.

**Isotopes:** Forms of an element having the same number of protons in their nuclei, but with differing numbers of neutrons.

**Joule:** The basic *Système International d'Unités* (SI) unit of work or energy. The amount of energy exerted when a force of one Newton is applied over a displacement of one meter.

**Laboratories, heavy:** Laboratories characterized by high-bay construction, overhead cranes, and in some cases, shielding. Heavy laboratories are typically used for large research apparatus or large mechanical test equipment.

**Laboratories, light:** Laboratories characterized by small equipment and apparatus, typically used for direct bench-scale research.

**Land use:** The purpose or activity for which a piece of land and/or its buildings is designed, arranged, or intended, or for which it is occupied or maintained.

**Laser:** A device for producing monochromatic (single-color) “light” in a coherent beam. This condition creates a beam with little scattering having a high concentration of energy per unit area of the beam.

**Latent cancer fatality (LCF):** The excess cancer fatalities in a population due to exposure to a carcinogen or ionizing radiation.

**Lead (Pb):** A soft, malleable, ductile, bluish-white, dense metallic element (atomic number 82) extracted chiefly from galena and used in containers and pipes for corrosives, solder and type metal, bullets, radiation shielding, paints and antiknock compounds. It is very resistant to corrosion but tarnishes upon exposure to air.

**Leak Path Factor (LPF):** The fraction of airborne materials transported from containment or confinement deposition or filtration mechanism (e.g., fraction of airborne material in a glovebox leaving the glovebox under static conditions, fraction of material passing through a HEPA filter). LPF is one of the factors used to calculate the source term for an accident or event.

**Level of concern:** The concentration of an extremely hazardous substance (EHS) in air above which there may be serious irreversible health effects or death as a result of a single exposure for a relatively short period of time.



**Light Water Reactor (LWR):** A nuclear power reactor using water to cool the reactor and to moderate (slow down) neutrons. It belongs to the class of nuclear power plants called “thermal reactors.”

**Loss-of-coolant accident:** An accident that results from the loss of reactor coolant because of a break in the reactor coolant system.

**Low-enriched uranium (LEU):** Uranium with uranium-235 enriched above the natural concentration (approximately 0.711 percent) but below 20 percent; highly enriched uranium (HEU) is enriched to 20 percent or higher U-235.

**Low-income status:** Based on Census Bureau data definitions of individuals below the poverty line. For the 2000 Census, for example, low-income status included individuals in 4-person families with 1999 income at or below \$17,029. Other poverty thresholds are provided by the Census Bureau for larger and smaller family sizes.

**Low-level radioactive waste (LLW):** As defined in the *Low-Level Radioactive Waste Policy Amendments Act* (LLRWPA) of 1985, as amended, means radioactive material that is not high-level radioactive waste, spent nuclear fuel, or byproduct material, as defined in section 11e.(2) of the *Atomic Energy Act* of 1954; and radioactive material that NRC, consistent with existing law and in accordance with paragraph (A) of section 2(9) of the LLRWPA, classifies as low-level radioactive waste. The term “low-level radioactive waste” does not include byproduct material as defined in paragraphs (3) and (4) of section 11e. of the *Atomic Energy Act* of 1954.

**Magnitude:** A measure of the strength of an earthquake or the strain energy released by it; the logarithm of the amplitude of motion recorded on a seismograph.

**Material-at-risk:** The maximum amount of the referenced material that is involved in the process and thus at risk in the event of a postulated accident. Material locked in a secure storage is not considered to be material-at-risk.

**Maximally exposed individual (MEI):** A hypothetical member of the public at a fixed location who, over an entire year, receives the maximum effective dose equivalent (summed over all pathways) from a given source of radionuclide releases to air. Generally, the MEI is different for each source at a site.

**Maximum credible accident:** An accident that has the greatest offsite consequences from hazardous material release and that has a frequency of occurrence greater than  $10^{-6}$  per year, when credit for mitigation is allowed. Such an accident is one of the set of reasonably foreseeable accidents.

**Mercury (Hg):** A metallic element primarily obtained by reduction from cinnabar, one of its ores. It is a heavy, opaque, glistening liquid (commonly called quicksilver), and is used in barometers, thermometers, etc., (atomic number 80).

**Meteorology:** The science dealing with the atmosphere and its phenomena, especially as it relates to weather.

**Metric tons of heavy metal (MTHM):** Quantities of spent nuclear fuel are traditionally expressed in terms of metric tons of heavy metal (typically uranium), without the inclusion of other materials, such as cladding, alloy materials, and structural materials. A metric ton is 1,000 kilograms, which is equal to about 2,200 pounds.

**Millirem (mrem):** One-one-thousandth of a rem (*see* “Rem”).

**Minority populations:** Includes individuals who report themselves as belonging to any of the following racial groups: Black (reported their race as “Black or Negro,” or reported entries such as “African American, Afro-American, Black Puerto Rican, Jamaican, Nigerian, West Indian, or Haitian”); American Indian; Eskimo or Aleut; Asian or Pacific Islander; or “Other Race.” In addition, individuals identifying themselves as Hispanic origin are also included in the minority category. Hispanics can be of any race, however. To avoid double-counting minority Hispanic individuals, only white Hispanics were included in the number of racially based minorities in a tabulation, since nonwhite Hispanics had already been counted under their minority racial classification. Minority populations exist where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than in the general population or other appropriate unit of geographic analysis (such as a governing body’s jurisdiction, a neighborhood, census tract, or other similar unit). Minority populations include either a single minority group or the total of all minority persons in the affected area. They may consist of groups of individuals living in geographic proximity to one another or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. (*See* “environmental justice” and “low-income status”).

**Mitigate:** 1) To avoid an impact altogether by not taking a certain action or parts of an action; 2) to minimize impacts by limiting the degree or magnitude of an action and its implementation; 3) to rectify an impact by repairing, rehabilitating, or restoring the affected environment; 4) to reduce or eliminate the impact over time by preservation and maintenance operations during the life of an action; or 5) to compensate for an impact by replacing or providing substitute resources or environments.

**Mixed fission products:** The ensemble of fission products resulting from the fission of a heavy element such as uranium. *See* “Fission.”

**Mixed Oxide (MOX) Fuel:** Reactor fuel made with a physical blend of oxides of different elements, such as uranium and plutonium.

**Mixed waste:** Radioactive waste that contains both (a) source, special nuclear, or by-product material subject to the *Atomic Energy Act* of 1954, as amended, and (b) a hazardous component subject to the *Resource Conservation and Recovery Act* (RCRA), as amended.

**Model:** A conceptual, mathematical, or physical system obeying certain specified conditions, whose behavior is used to understand the physical system to which it is analogous.

**Modular Helium-cooled Reactor (MHR):** The MHR is a type of gas-cooled reactor that is a candidate for hydrogen production using either thermochemical or high temperature electrolysis (HTE) processes. The overall efficiencies of these processes depend strongly on their process temperatures. The MHR has the capability of delivering coolant at very high temperature.

**Mutagen:** A substance that causes genetic or inheritable defects.

**National Ambient Air Quality Standards (NAAQS):** Air quality standards established by the *Clean Air Act*, as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

**National Emission Standards for Hazardous Air Pollutants (NESHAP):** A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These were implemented in the *Clean Air Act* Amendments of 1977.

**National Environmental Policy Act (NEPA):** NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals (in Section 101), and provides means (in Section 102) for carrying out the policy. Section 102(2) contains “action-forcing” provisions to ensure that Federal agencies follow the letter and spirit of the Act. For major Federal actions significantly affecting the quality of the human environment, Section 102(2)(C) of NEPA requires Federal agencies to prepare a detailed statement that includes the environmental impacts of the proposed action and other specified information.

**National Pollutant Discharge Elimination System (NPDES):** Federal regulation under the *Clean Water Act* that requires permits for discharges into surface waterways.

**National Register of Historic Places (NRHP):** A register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. It is maintained by the Department of Interior and was established pursuant to the *National Historic Preservation Act* of 1966, as amended.

**Natural uranium:** Uranium as it occurs in nature. The natural substance is approximately 99.28 percent U-238, 0.711 percent U-235, and 0.0055 percent U-234.

**Neutron:** An uncharged elementary particle with a mass slightly greater than that of the proton, found in the nucleus of every atom heavier than hydrogen-1; a free neutron is unstable and decays with a half-life of about 13 minutes into an electron and a proton.

**Nonattainment area:** An air quality control region (or portion thereof) in which the EPA has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

**Nonhazardous wastes:** Routinely generated, nonhazardous solid wastes include general facility refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, dirt, and rubble.

**Noninvolved worker:** Worker who would be on the site of an action but would not participate in the action.

**Non-ionizing radiation:** Non-ionizing radiation includes the spectrum of ultraviolet (main sources are the sun and some industrial equipment such as welding arcs), visible light, infrared (sources are emitters of heat—for example, furnaces and heat lamps), microwave and radio frequency (sources include microwave ovens, radio emitters and cell phones), and extremely low frequency radiation (produced by power lines, electrical wiring, and electrical equipment).

**Nonpoint source:** Any nonconfined area from which pollutants are discharged into a body of water (e.g., agricultural runoff, construction runoff, and parking lot drainage), or into air (e.g., fugitive dust from construction sites).

**Normal operations:** All conditions that frequency estimation techniques indicate occur with a frequency of more than 0.1 event per year.

**Nonproliferation:** To prevent or impede proliferation. In the context of nuclear weapons, to limit the spread of nuclear weapons and related technology and capabilities.

**Nuclear reaction:** A process in which an element's atomic nucleus is transformed into another isotope of the same element or into another element altogether. The process always is accompanied by the release of particles or energy.

**Nuclide:** A species of atom characterized by the constitution of its nucleus. The nuclear constitution is specified by the number of protons, number of neutrons, and energy content; or, alternatively, by the atomic number, mass number, and atomic mass. To be regarded as a distinct nuclide, the atom must be capable of existing for a measurable length of time.

**Numerical simulation:** The use of mathematical formulas and models of physical processes to simulate through calculations the behavior or performance of a device or complex system.

**Order of magnitude:** A factor of 10. When a measurement is made with a result such as  $3 \times 10^7$ , the exponent of 10 (here, 7) is the order of magnitude of that measurement. To say that this result is known to within an order of magnitude is to say that the true value lies (in this example) between  $3 \times 10^6$  and  $3 \times 10^8$ .

**Ozone (O<sub>3</sub>):** The triatomic form of oxygen. In the stratosphere, ozone protects the Earth from the sun's ultraviolet rays; in the lower levels of the atmosphere, ozone is considered an air pollutant.

**Packaging:** In the NRC regulations governing the transportation of radioactive materials (10 CFR Part 71), the term "packaging" is used to mean the shipping container together with its radioactive contents.

**Particulate (airborne):** Small particles that are emitted from fixed or mobile sources and dispersed in the atmosphere.

**Parts per billion (ppb):** A unit of measure for the concentration of a substance in its surrounding medium; for example, 1 billion grams of water containing 1 gram of salt has a salt concentration of 1 part per billion.

**Parts per million (ppm):** A unit of measure for the concentration of a substance in its surrounding medium; for example, 1 million grams of water containing 1 gram of salt has a salt concentration of 1 part per million.

**Pasquill stability categories:** Classification scheme that describes the degree of atmospheric turbulence. Categories range from extremely unstable (A) to extremely stable (F). Unstable conditions promote the rapid dispersion of atmospheric contaminants and result in lower air concentrations as compared with stable conditions.

**Perennial stream:** A surface water body that has constant flow.

**Permeability:** The degree of ease with which fluids and gases can pass through rock, sediment, soil, or other material.

**Permissible Exposure Limit (PEL):** Occupational exposure limit regulations endorsed by OSHA. A permissible exposure limit may be for short-term or 8-hour duration exposure.

**Person-rem:** A unit of collective dose commitment to a given population; it is the product of the average dose equivalent (in rem) to a given organ or tissue multiplied by the number of persons in the population of interest.

**Plume:** The spatial distribution of a release of airborne or waterborne material as it disperses in the environment.

**Plutonium (Pu):** A fissile element of atomic number 94. Defined as a heavy, radioactive, metallic element, that produces ionizing radiation in the form of alpha particles. Produced in a reactor by bombarding uranium with neutrons, plutonium is used in nuclear weapons and also can be used as fuel in fission reactors. The 15 radioactive plutonium isotopes have half-lives ranging from less than a second to thousands of years.

**PM<sub>2.5</sub>:** Fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less. A micrometer, also known as a *micron*, is a length equal to one-millionth of a meter. To put this in perspective, the diameter of human hair is generally between 20 and 180 micrometers.

**PM<sub>10</sub>:** Fine particulate matter with an aerodynamic diameter of 10 micrometers or less. A micrometer, also known as a *micron*, is a length equal to one-millionth of a meter. To put this in perspective, the diameter of human hair is generally between 20 and 180 micrometers.

**Point source:** As used in this PEIS, a single point of either industrial air emissions or water discharge, regulated under the *Clean Air Act* and *Clean Water Act*, respectively.

**Population dose (population exposure):** Summation of individual radiation doses received by all those exposed to the source or event being considered. The collective radiation dose received by a population group, and usually measured in units of person-rem.

**Prehistoric resources:** See “Cultural resources (prehistoric).”

**Pressurized water reactors (PWRs):** (also VVER if of Russian design): Generation II nuclear power reactors that use ordinary water under high pressure as coolant and neutron moderator. The primary coolant loop is kept under high pressure to prevent the water from reaching film boiling, hence the name. PWRs are the most common type of power producing reactor and are widely used all over the world.

**Primary and secondary containment:** Primary containment is that set of engineered safety features immediately around a radioactive or hazardous material designed to prevent its release; secondary containment is the set of backup features outside the primary containment.

**Probabilistic:** With results taking into account the probability of occurrence. Probabilistic calculations sometimes combine the results of several deterministic calculations, weighting their results by their probabilities. See “Deterministic.”

**Proliferation:** To increase in number. In the context of nuclear weapons, any increase in the number of countries or persons possessing such weapons.

**Prompt radiation:** Gamma or neutron radiation emitted during the fission process is said to be prompt (within microseconds) as distinguished from delayed (as much as seconds).

**Protective (Preventive) Action Guide:** FDA-recommended levels of radiation exposure above which action should be taken to prevent or reduce the radioactive contamination of human food or animal feeds.

**Quality assurance (QA):** A system of activities whose purpose is to provide the assurance that standards of quality are attained with a stated level of confidence.

**Quality factor:** The factor by which the absorbed dose (rad) is multiplied to obtain a quantity that expresses (on a common scale for all ionizing radiation) the biological damage to exposed persons; usually used because some types of radiation, such as alpha particles, are biologically more damaging than others. Quality factors for alpha, beta, and gamma radiation are in the ratio 20:1:1.

**Rad:** The unit of absorbed dose and the quantity of energy imparted by ionizing radiation to a unit mass of matter such as tissue, and equal to 0.01 joule per kilogram, or 0.01 gray.

**Radiation:** The emitted particles or photons from the nuclei of radioactive atoms; including alpha, beta, gamma, and neutrons. Some elements are naturally radioactive; others are induced to become radioactive by bombardment in a reactor. Naturally occurring radiation is indistinguishable from induced radiation.

**Radioactive decay:** The spontaneous transformation of one radionuclide into a different nuclide (which may or may not be radioactive), or de-excitation to a lower energy state of the nucleus by emission of nuclear radiation, primarily alpha or beta particles, or gamma rays (photons).

**Radioactive material:** Any material having a specific activity greater than 0.002 microcuries per gram, as defined by 49 CFR 173.403(y).

**Radioactive waste:** Any waste that must be managed for its radioactive content.

**Radioactivity:** The spontaneous emission of nuclear radiation, generally alpha or beta particles, or gamma rays, from the nucleus of an unstable isotope.

**Radiological risk:** The magnitude (severity) of the adverse consequence (dose) and the probability of the occurrence; calculated by considering a wide range of occurrences, from high-probability, low-consequence events to low-probability, high-consequence events.

**Radionuclide:** An unstable nuclide. *See* “Nuclide” and “Radioactivity.” One standard practice for naming a radionuclide is to use the name or atomic symbol of an element followed by its atomic weight (e.g., cobalt-60, a radionuclide of cobalt).

**Radiotoxicity:** A measure of the hazard to human health posed by radioactive material. It represents the potential biological damage to humans if they are exposed to a material (such as by proximity or breathing in air or drinking water contaminated with radionuclides). Because different radionuclides have different biological effects, the total radiotoxicity from a group of radionuclides is the sum of the radiotoxicity of each radionuclide.

**Radon:** A colorless, tasteless, and chemically inert radioactive gas (atomic number 86).

**RADTRAN 5:** An NRC-approved code for estimating the radiological impacts of transportation of radioactive materials.

**Rare species:** Populations and/or individuals occurring in very low numbers relative to other similar taxa in the state, although common or regularly occurring throughout much of their range. They may be found in a restricted geographic region or occur sparsely over a wider area. Although rare, populations are apparently stable.

**RCRA Part B permit:** A permit issued by EPA or an authorized state under the *Resource Conservation and Recovery Act* (RCRA), for a hazardous waste treatment, storage or disposal facility.

**Reactor:** A device or apparatus in which a chain reaction of fissionable material is initiated and controlled; a nuclear reactor.

**Reactor coolant system:** The system used to modulate temperature through the transfer of energy from the reactor core either directly or indirectly to the heat rejection system.

**Reactor core:** The fuel assemblies including the fuel rods, control assemblies, blanket assemblies, safety rods, and coolant/moderator.

**Reasonably foreseeable:** An accident or action whose impacts “may have large or catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason” (40 CFR 1502.22(b)(4)).

**Region of influence (ROI):** A geographic area within which activities may affect a particular resource.

**Release fraction:** The fraction of the material-at-risk that is released in an accident.

**Rem:** A unit of radiation dose equivalent and effective dose equivalent describing the effectiveness of a type of radiation to produce biological effects; coined from the phrase “roentgen equivalent man.” The product of the absorbed dose (rad) and a quality factor (Q).

**Repository:** As defined in the *Nuclear Waste Policy Act* of 1982, as amended, any system licensed by NRC that is intended to be used for, or may be used for, the permanent deep geologic disposal of high-level radioactive waste and spent nuclear fuel, whether or not, such system is designed to permit the recovery, for a limited period during initial operation, of any materials placed in such system. Includes both surface and subsurface areas at which high-level radioactive waste and spent nuclear fuel handling activities are conducted.

**Request for an Expression of Interest (EOI):** An advertisement or letter requesting responses from suitably qualified firms or individuals, usually by a set date and usually in response to an information package containing the Terms of Reference. The term is usually used in regards to the supply of professional services.

**Respirable Fraction (RF):** The fraction of airborne radionuclides, as particles, that can be transported through air and inhaled into the human respiratory system. This term is commonly assumed to include particles 10-µm (micron) Aerodynamic Equivalent Diameter and less.

**Retention tanks:** Tanks in which liquid wastes are held pending determination of what, if any, treatment they require before disposal.

**Risk assessment:** The use of established methods to measure the risks posed by an activity or exposure by evaluating the relationship between exposure to substances and the subsequent occurrence of health effects and the likelihood for that exposure to occur.



**Risk estimator:** A number used to convert the measured or calculated effective dose equivalent to estimates of latent fatal cancers that can be attributed to the exposure.

**Risk factor:** Numerical estimate of the severity of harm associated with exposure to a particular risk agent.

**Roentgen:** A unit of exposure to ionizing x-rays or gamma radiation equal to or producing 1 electrostatic unit per cubic centimeter of air. It is approximately equal to 1 rad.

**Sanitary waste:** Most simply, waste generated by routine operations that is not regulated as hazardous or radioactive by state or Federal agencies.

**Scenario:** A particular chain of hypothetical circumstances that could, in principle, release radioactivity or hazardous chemicals from a storage and handling site, or during a transportation accident.

**Scope:** In a document prepared pursuant to the *National Environmental Policy Act* (NEPA), the range of actions, alternatives, and impacts to be considered.

**Scoping:** An early and open process for determining the scope of issues to be addressed in an EIS and for identifying the significant issues related to a Proposed Action. The scoping period begins after publication in the *Federal Register* of a Notice of Intent (NOI) to prepare an EIS. The public scoping process is that portion of the process where the public is invited to participate. DOE also conducts an early internal scoping process for environmental assessments or EISs. For EISs, this internal scoping process precedes the public scoping process. DOE's scoping procedures are found in 10 CFR 1021.311.

**Seismicity:** The phenomenon of earth movements; seismic activity. Seismicity is related to the location, size, and rate of occurrence of earthquakes.

**Separative Work Unit:** A measurement of the work expended during the uranium enrichment process.

**Severity:** Function of the magnitudes of the mechanical forces (impact) and thermal forces (fire) to which a package may be subjected during an accident; any sequence of events that results in an accident in which a transport package is subjected to forces within a certain range of values is assigned to the accident severity category associated with that range.

**Shielding:** Any material or obstruction (bulkheads, walls, or other constructions) that absorbs radiation in order to protect personnel or equipment.

**Slightly enriched uranium:** Nuclear fuel which has a U-235 concentration of from 0.9 percent to 2 percent.

**Slow neutrons:** Neutrons in thermal equilibrium with the surrounding medium, especially those produced by fission and slowed by a moderator. Also called thermal neutrons.

**Sludge:** Precipitated solid matter produced by the use of a liquid in a treatment process.

**Socioeconomics (analyses):** Analyses of those parts of the human environment in a particular location that are related to existing and potential future economic and social conditions. The welfare of human beings as related to the production, distribution, and consumption of goods and services.

**Solid waste:** Any nonhazardous garbage, refuse, or sludge that is primarily solid, but may also include semisolid or contained gaseous material, resulting from residential, industrial, commercial, agricultural, or mining operations, and community activities.

**Source:** Any physical entity that may cause radiation or chemical exposure, for example by emitting ionizing radiation or releasing radioactive or hazardous material.

**Source material:** As defined in the *Atomic Energy Act* of 1954 (AEA), as amended, means uranium, thorium, or any other material which is determined by NRC pursuant to the provision of section 61 of the AEA to be source material; or ores containing one or more of the foregoing materials, in such concentration as NRC may by regulation determine from time to time.

**Source term:** In a calculation of contaminant dispersion, the amount of that contaminant assumed available to be dispersed. Source term is calculated as the product of material-at-risk (MAR), damage ratio (DR), respirable fraction (RF), airborne release fraction (ARF), and leak path factor (LPF).

**Special nuclear material (SNM):** As defined in the *Atomic Energy Act* of 1954 (AEA), as amended, means plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which NRC, pursuant to the provisions of section 51 of the AEA, determines to be special nuclear material, but does not include source material; or any material artificially enriched by any of the foregoing, but does not include source material.

**Species of concern:** Plants and animals whose conservation status may be of concern to the U.S. Fish and Wildlife Service, but do not have official or legal protection status under the provisions of the *Endangered Species Act* of 1973, as amended.

**Specific activity:** The amount of radioactivity per unit volume or mass.

**Specific conductance:** The measure of the ability of a material to conduct electricity; also called conductivity.

**Spent Nuclear Fuel (SNF):** As defined in the *Nuclear Waste Policy Act* of 1982, as amended, fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

**Stability class:** See “Pasquill stability categories.”

**Standard deviation:** A measure of dispersion used in statistical theory for the average variation of a random quantity, the root-mean-square deviation from an average value.

**Stoichiometric:** Pertaining to or involving substances that are in the exact proportions required for a given reaction.

**Storage:** As defined by the *Nuclear Waste Policy Act* of 1982, as amended, retention of radioactive waste, spent nuclear fuel, or transuranic waste with the intent to recover such waste or fuel for subsequent use, processing or disposal.

**Stormwater Pollution Prevention Plan:** A plan required by an NPDES permit for controlling stormwater pollution resulting from construction or industrial activities.

**Strontium (Sr):** Naturally occurring element with 38 protons in its nucleus. Some manmade isotopes of strontium are radioactive (e.g., strontium-89, strontium-90). Strontium-90 is a common fission product from a nuclear reactor.

**Sulfur oxides:** Chemical compounds containing sulfur and oxygen. Sulfur dioxide is a regulated criteria air pollutant under the NAAQS.

**Système International d'Unités/International System of Units (SI):** An international system of physical units which include meter (length), kilogram (mass), Kelvin (temperature), becquerel (radioactivity), gray (radioactive dose), and sievert (dose equivalent).

**Tailings:** Ground rock remaining after particular ore minerals, such as uranium oxides, are extracted.

**Target:** As used in this PEIS, refers to the non-uniform positioning of radioactive elements in a reactor core for the purpose of transmuting those elements.

**Temporary Emergency Exposure Limits:** The Temporary Emergency Exposure Limits were developed by the DOE Subcommittee on Consequences Assessment and Protective Actions (SCAPA) for chemicals where Emergency Response Planning Guidelines (ERPG) values are not available and serve as a temporary guidance until ERPGs can be developed.

**Thermal neutron:** A neutron in thermal equilibrium with the surrounding medium, especially one produced by fission and slowed by a moderator. Also called a slow neutron.

**Thermoluminescent dosimeter (TLD):** A device used to measure external beta or gamma radiation levels, and which contains a material that, after exposure to beta or gamma radiation, emits light when processed and heated.

**Thorium:** A silvery metallic element (atomic number 90).

**Threatened species:** A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range that is legally protected.

**Threshold Limits Values/Time-Weighted Average (TLV®/TWA):** Guidelines or recommendations that refer to airborne concentrations of potentially hazardous substances. A time-weighted average TLV® is an average for a normal 8-hour workday or 40-hour workweek, to which it is believed all workers may be repeatedly exposed, day after day, without adverse effect.

**Time-weighted average (TWA):** The average exposure to a substance which can be expected during 8 or 10 hours of work per day during a 40-hour work week.

**Topography:** Topography refers to the shape of the land with respect to hills and valleys. Topography can have a strong influence on transport and dispersion of pollutant emissions. To accurately assess the impacts of a new emission source, computer models must include topographical data to identify the presence of buildings, large hills, mountains, or valleys near the source.

**Toxicity assessment:** Identification of the types of adverse health effects associated with exposures and the relationship between the magnitude of the exposure and of the adverse effects.

**Transmutation:** The conversion of one element to another by changing its atomic structure.

**Transmutation fuel:** Transmutation fuel is a mixture of uranium and various transuranic elements recovered from the reprocessing of spent nuclear fuel. These transuranic elements can consist of various isotopes of plutonium, neptunium, curium, and americium. In addition, various lanthanide elements may also be included in the transmutation fuel depending upon the LWR spent fuel recovery process. The physical form of the transmutation fuel is expected to be metal or oxide, near term. Other physical forms may be developed longer term.

**Transportation Aging and Disposal Canister (TAD):** SNF and HLW would arrive at the planned Yucca Mountain geologic repository in canisters, TADs, contained within transportation casks. The TADs would be removed from the transportation cask and placed into waste packages. The waste packages would then be sealed and prepared for emplacement in the geologic repository.

**Transuranics:** Any element with an atomic number greater than 92 (uranium).

**Transuranic waste:** As defined in the *Waste Isolation Pilot Plant Land Withdrawal Act*, as amended, transuranic waste means waste that contains more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for: high-level radioactive waste; waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or waste that the Nuclear Regulatory Commission has approved for disposal on a case-by case basis in accordance with 10 CFR Part 61. Transuranic waste is a radioactive waste category that applies to waste owned or generated by DOE.

**Tritiated water:** Water in which one of the hydrogen atoms has been replaced by a tritium atom; sometimes shown as HTO.

**Tritium:** The radioactive isotope of hydrogen, containing one proton and two neutrons in its nucleus, which decays at a half-life of 12.3 years by emitting a low-energy beta particle. Common symbols for this isotope are H-3 and T.

**Type A packaging:** Designed to retain the integrity of containment of the enclosed substances and shielding containers or canisters under normal conditions of transport as demonstrated by a water spray test, a free-drop test, a compression test, and a penetration test as defined by 49 CFR 173.403, 173.465.

**Type B packaging:** A DOE, U.S. Department of Transportation (DOT), and NRC certified container that must be used for the transport of transuranic waste containing more than 20 curies of plutonium per package. Type B packaging must be able to withstand both normal and accident conditions without releasing its radioactive contents. These containers are tested under severe, hypothetical accident conditions that demonstrate resistance to impact, puncture, fire, and submersion in water (49 CFR Part 173).

**Uranium:** A naturally occurring, heavy metallic element. Designated atomic number 92, uranium has many radioactive isotopes. Enriched uranium is most commonly used as a fuel for nuclear fission, while U-238 is the most abundant isotope in nature. *See* “Natural uranium.”

**Vitrification:** A method of immobilizing waste (e.g., radioactive, hazardous, and mixed). This involves combining other materials and waste and melting the mixture into glass. The purpose of this process is to immobilize the waste so it can be isolated from the environment.

**Volatile organic compound (VOC):** Liquid or solid organic compounds that have a high vapor pressure at normal pressures and temperatures and thus tend to spontaneously pass into the vapor state.

**Waste Isolation Pilot Plant (WIPP):** A facility in southeastern New Mexico which was authorized under section 213 of the DOE National Security and Military Applications of *Nuclear Energy Authorization Act* of 1980 to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities. WIPP began accepting wastes on March 26, 1999.

**Waste management:** The planning, coordination, and direction of those functions related to the generation, handling, treatment, storage, transport, and disposal of waste, as well as associated surveillance and maintenance activities.

**Waste minimization:** Actions that economically avoid or reduce the generation of waste by source reduction, reducing the toxicity of hazardous waste, improving energy usage, or recycling. These actions will be consistent with the general goal of minimizing current and future threats to human health, safety, and the environment.

**Wastewater treatment plant:** A collection of treatment processes and facilities designed and built to reduce the amount of suspended solids, bacteria, oxygen-demanding materials, and chemical constituents in wastewater.

**Water table:** The water-level surface below the ground at which the unsaturated zone ends and the saturated zone begins, and the level to which a well that is screened in the unconfined aquifer would fill with water.

**Weapons grade:** Refers to a substance that is pure enough to use in a weapon. Commonly used in reference to plutonium or uranium used in nuclear weapons, but also used for biological and chemical weapons.

**Weapons of mass destruction:** Umbrella term that includes nuclear, chemical, and biological weapons.

**Wetland:** An area that has water at or near the surface of the ground during normal circumstances (wetland hydrology). It supports or is capable of supporting plants that are adapted to wet habitats (hydrophytic vegetation) and has soils that have developed under wet conditions (hydric soils).

**Whole-body radiation:** The dose resulting from the uniform exposure of all organs and tissues in the human body.

**X-rays:** Penetrating electromagnetic radiations with wavelengths shorter than those of visible light, usually produced by irradiating a metallic target with large numbers of high-energy electrons. In nuclear reactions, it is customary to refer to photons originating outside the nucleus as x-rays and those originating in the nucleus as gamma rays, even though they are the same.

**Zoning:** The division of city or county by legislative regulations into areas, or zones, that specify allowable uses for real property and size restrictions for buildings within these areas.